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Re Applic of	Raschid J. Bezama, et al.
Docket No.	FIS920010260US1
Serial No.	10/026,264
Filing Date	12/21/01
Attorney	Ira D. Blecker

Attached: **APPEAL BRIEF, APPEAL BRIEF TRANSMITTAL, 4 REFERENCES****PLEASE DELIVER TO:**

EXAMINER: PHASGE, ARUN S.

ART UNIT: 1753

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TRANSMITTAL OF APPEAL BRIEF (Leave Empty)					Court No.	
In Re Application Of: <u>Michael J. Deane, et al.</u>					77820010001001	
Application No.	Filing Date	Examiner	Case No.	Group An Unit	Confirmation No.	
10000000	12/21/01	PIRAGE, ALUS O.	32074	1722	7874	
Inventor: APPARATUS FOR CLEANING RESIDUAL MATERIAL FROM AN ARTICLE						
<b>COMMUNICABLES SECTION</b>						
Transmitted herewith is: Duplicate is the Appeal Brief in this application, with respect to the Notice of Appeal filed on:						
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<u>Michael J. Deane</u> MICHAEL J. DEANE, NTP, 37, 32-1 10000000, 10000000, 10000000 10000000, 10000000, 10000000			Date: <u>March 25, 2005</u> CERTIFICATION OF FACSIMILE TRANSMISSION I, the undersigned, being a duly qualified and authorized agent of the United States Patent and Trademark Office, do hereby certify that the foregoing is a true and correct copy of the original as filed.			

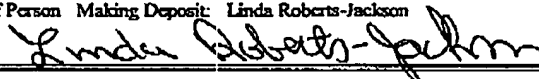
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**Date:** 3/25/05**In re Application of:** Raschid J. Bezama, et al.**Filed:** 12/21/01**For:** APPARATUS FOR CLEANING RESIDUAL MATERIAL FROM  
AN ARTICLE**Serial Number:** 10/026,264**Confirmation No.:** 7876**Art Unit:** 1753**Examiner:** PHASGE, ARUN S.**APPEAL BRIEF**

Hon. Commissioner of Patents and Trademarks

P. O. Box 1450

Alexandria, VA 22313-1450

Dear Sir:

On January 27, 2005, Appellants appealed to the Board of Patent Appeals and Interferences from the decision of the Primary Examiner finally rejecting claims 1 to 22. What follows is Appellants' Appeal Brief as required by 37 CFR 41.37.

**REAL PARTY IN INTEREST:**

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**10/026,264**

**Patent**  
**IBM Docket No. FIS920010260US1**

**REAL PARTY IN INTEREST:**

International Business Machines Corporation, the assignee of the entire interest of the present application, is the real party in interest in this appeal.

**RELATED APPEALS AND INTERFERENCES:**

Appellants bring to the attention of the Board an appeal in U.S. patent application 10/026,239, which is assigned to International Business Machines Corporation as well. The present appeal is with respect to an apparatus for cleaning residual material from an article while the appeal in U.S. patent application 10/026,239 is with respect to a process for cleaning paste residue from a workpiece. No decision has been reached in the appeal of U.S. Patent Application 10/026,239. While these appeals relate to related subject matter, each appeal should be decided on its own merits.

**STATUS OF CLAIMS:**

Claims 1 to 22 are pending in this appeal and all of claims 1 to 22 have been finally rejected by the Examiner. No claims have been withdrawn or canceled. No claims are allowed.

**10/026,264****Patent**  
**IBM Docket No. FIS920010260US1****STATUS OF AMENDMENTS:**

In response to the final Office Action mailed October 27, 2004, Appellants submitted a Response Pursuant to 37 CFR §116 and a Notice of Appeal on January 27, 2005. In an Advisory Action mailed March 2, 2004, the Examiner considered the Response Pursuant to 37 CFR §116 but the Response Pursuant to 37 CFR §116, according to the Examiner, did not place the application in condition for allowance.

It appears as though the Advisory Action is erroneous in at least one respect. That is, in paragraph 2, the Advisory Action states that "The reply was filed after the date of filing a Notice of Appeal, but prior to the date of filing an appeal brief." This is erroneous since the reply was filed the same date as the Notice of Appeal.

**SUMMARY OF CLAIMED SUBJECT MATTER:**

The present invention is directed to an apparatus that chemically, mechanically and electrolytically cleans residual material from an article with a suitable cleaning agent. In a preferred embodiment, the apparatus chemically, mechanically and electrolytically cleans paste residue from a screening mask utilizing an aqueous solution of tetramethyl ammonium hydroxide as the preferred cleaning agent.

There are two independent claims - claims 1 and 12.

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**I. Invention of claim 1:**

As embodied in claim 1, the apparatus 10 comprises opposing nozzle assemblies 18, 30 with the article 12 to be cleaned interposed between the opposing nozzle assemblies 18, 30. First nozzle assembly 18 has nozzle 20 which sprays cleaning agent in a first pattern and nozzle 22 which sprays cleaning agent in a second pattern. Second nozzle assembly 30 has a nozzle 32 which sprays cleaning agent in a third pattern. (Figure 1; specification page 15, lines 4-16). The apparatus 10 has a transport apparatus which provides relative movement between the article 12 and nozzle assemblies 18, 30. For purposes of illustration, support 38 can serve to transport article 12 up or down. (Figure 1; specification page 18, lines 15-22). Cleaning agent is supplied through supply panel 42 to the opposing nozzle assemblies 18, 30. Electrical power is supplied to nozzle 22 by power supply 46. (Figure 4; specification page 17, lines 10-20).

In operation, nozzle 20 of the first nozzle assembly 18 is operable during a first pass of the nozzle assembly 18 with respect to the article 12 to spray the cleaning agent on the article 12 so as to chemically and mechanically remove residual material from the article 12. In a second pass of the first nozzle assembly 18 with respect to the article 12, nozzle 22 is operable to spray cleaning agent on the article as a voltage is applied between nozzle 22 and article 12 to chemically and electrochemically remove the remaining residual material from the article 12. (Figures 7A and 7B; specification page 20, lines 12-26 to page 21, lines 1-8).

For the convenience of the Board, claim 1 is reproduced herein as follows:

1. An apparatus for cleaning residual material from an article comprising:

a) a source of a cleaning agent;

b) at least one pair of opposing spray nozzle assemblies directed to spray an article interposed

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between the opposing spray nozzle assemblies, a first of the opposing spray nozzle assemblies comprising a first nozzle for spraying the cleaning agent in a first pattern and a second nozzle for spraying the cleaning agent in a second pattern, and a second of the opposing spray nozzle assemblies comprising a first nozzle for spraying the cleaning agent in a third pattern;

c) a supply conduit from the source of the cleaning agent to each of the first and second nozzles;

d) a power source electrically connected to the second nozzle; and

e) a transport apparatus to transport one of the opposing nozzle assemblies and the article with respect to each other;

f) wherein, in operation, in a first pass the first nozzle of at least the first nozzle assembly is operable to spray the article with a spray of the cleaning agent as the first nozzle assembly and article are transported with respect to each other to chemically and mechanically remove residual material from the article and in a second pass the second nozzle of the first nozzle assembly is operable to spray the article with a cleaning agent as a voltage is applied between the second nozzle of the first nozzle assembly and the article and as the first nozzle assembly and article are transported with respect to each other to chemically and electrochemically remove the remaining residual material from the article.

**II. Invention of claim 12:**

The invention as embodied in claim 12 is similar to the invention of claim 1 except that second nozzle assembly 130 now further includes a second nozzle 52 similar to nozzle 22. (Figure 5; specification page 21, lines 20-25).

In operation, nozzles 20, 32 of the first and second nozzle assemblies 18, 130 are operable during a first pass of the nozzle assemblies 18, 130 with respect to the article 12 to spray the cleaning agent on the article 12 so as to chemically and mechanically remove residual material from the article 12. In a second pass of the first and second nozzle assemblies 18, 130 with respect to the article 12, nozzles 22, 52 are operable to spray cleaning agent on the article as a

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voltage is applied between nozzles 22, 52 and article 12 to chemically and electrochemically remove the remaining residual material from the article 12. (Figures 8A and 8B; specification page 22, lines 4-22).

For the convenience of the Board, claim 12 is reproduced herein as follows:

12. An apparatus for cleaning residual material from an article comprising:

- a) a source of a cleaning agent;
- b) at least one pair of opposing spray nozzle assemblies directed to spray an article interposed between the opposing spray nozzle assemblies with each of the opposing spray nozzle assemblies comprising a first nozzle for spraying the cleaning agent in a first pattern and a second nozzle for spraying the cleaning agent in a second pattern;
- c) a supply conduit from the source of the cleaning agent to each of the first and second nozzles;
- d) a power source electrically connected to the second nozzles; and
- e) a transport apparatus to transport one of the opposing nozzle assemblies and the article with respect to each other;
- f) wherein, in operation, in a first pass the first nozzle of each of the nozzle assemblies is operable to spray the article with a spray of the cleaning agent as the nozzle assemblies and article are transported with respect to each other to chemically and mechanically remove residual material from the article and in a second pass the second nozzles of each of the nozzle assemblies is operable to spray the article with a cleaning agent as a voltage is applied between the second nozzles of each of the nozzle assemblies and the article and as the nozzle assemblies and article are transported with respect to each other to chemically and electrochemically remove the remaining residual material from the article.



**10/026,264****Patent  
IBM Docket No. FIS920010260US1****GROUND'S OF REJECTION TO BE REVIEWED ON APPEAL:****I. The §102 rejections:**

A. Claims 1 to 4, 10 to 13, 19 and 20 have been rejected by the Examiner under 35 USC §102(b) as being anticipated by European Patent Application 0 870 854 (hereafter "EP '854").

**II. The §103 rejections:**

A. Claims 5 and 14 have been rejected by the Examiner under 35 USC §103(a) as being unpatentable over EP '854 in view of Geissler et al. U.S. Patent 6,238,529 (hereafter "Geissler").

B. Claims 6, 7, 9 15, 16, 13, 21 and 22 have been rejected by the Examiner under 35 USC §103(a) as being unpatentable over EP '854 in view of Chandross et al. U.S. Patent 5,849,173 (hereafter "Chandross").

C. Claims 8 and 17 have been rejected by the Examiner under 35 USC §103(a) as being unpatentable over EP '854 in view of Wee et al. U.S. Patent 6,383,303 (hereafter "Wee").

**ARGUMENT:****I. The §102 Rejections:**

Claims 1 to 4, 10 to 13, 19 and 20 have been rejected by the Examiner under 35 USC §102(b) as being anticipated by EP '854.

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“Anticipation requires the disclosure in a single prior art reference of each element of the claim under consideration.” W.L. Gore & Assocs. V. Garlock, Inc., 721 F.2d 1540, 220 USPQ 303, 313 (Fed. Cir. 1983). If any element is missing, the claim is not anticipated. In re Royka and Martin, 490 F.2d 981, 180 USPQ 580 (CCPA 1974).

As Appellants will argue, each of claims 1 and 12 contain elements which have not been disclosed in EP '854, thereby compelling the conclusion that claims 1 and 12 are not anticipated by EP '854.

**A. Patentability of claims 1 and 12**

The Examiner has failed to show that EP '854 recites every feature of Appellants' claims 1 and 12. In Appellants' claims 1 and 12, a first nozzle during a first pass sprays the cleaning agent to chemically and mechanically remove residual material while a second nozzle in a second pass sprays the cleaning agent to chemically and electrochemically remove the remaining residual material. Appellants' invention is distinguishable from EP '854 in several respects.

First, Appellants' apparatus chemically and mechanically removes residual material and then chemically and electrochemically removes the remaining residual material. EP '854 electrocleans first and then rinses second. In the final Office Action, the Examiner indicates that the order of operations is irrelevant and, in any event, EP '854 discloses rinsing first and electrocleaning second. For the sake of argument, Appellants agree that the order of doing the operations is irrelevant but that is not the thrust of Appellants' invention. Appellants are claiming that their apparatus sprays the cleaning agent to chemically and mechanically remove residual material and then sprays the cleaning agent to chemically and electrochemically remove the remaining residual material. Again, EP '854 only discloses the apparatus rinsing and electrocleaning (or

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electrocleaning and rinsing) but does not disclose the apparatus spraying cleaning agent to chemically and mechanically remove residual material and spraying cleaning agent to chemically and electrochemically remove the remaining residual material as claimed by Appellants.

Second, the action provided by nozzles 4 and 5 is merely rinsing the cleaning agent applied by nozzles 1 and 2 or prewetting prior to application of the cleaning agent by nozzles 1 and 2. There is no disclosure in EP '854 that nozzles 4, 5 perform any other function than rinsing or prewetting. The "cleaning agent" provided by nozzles 4 and 5 of EP '854, while enabling prewetting or mechanical removal of residual material, apparently does not provide any chemical removal of residual material as does Appellants' first spraying of the cleaning agent. In the final Office Action, the Examiner indicates that Appellants are addressing the intended use and further the Examiner notes that Figure 2 of EP '854 shows two sets of nozzles electrocleaning. Taking the Examiner's last comment first, Appellants are not claiming two sets of nozzles that electroclean. Rather, Appellants are claiming an apparatus that both chemically and mechanically removes residual material and chemically and electrochemically removes residual material. With respect to the Examiner's first argument, Appellants are not claiming an intended use. It is a requirement of Appellants' claims 1 and 12 that a voltage is applied by the apparatus during the electrocleaning step. The converse of this is that during the chemical and mechanical cleaning performed by Appellants' apparatus, a voltage is not applied. That is, whether the apparatus does electrocleaning or not is a limitation of the apparatus (application of a voltage by the apparatus) and not merely an intended use.

Third, the cleaning agent (i.e., "the cleaning agent") is the same applied by both of the first and second nozzles in Appellants' invention whereas in EP '854 a cleaning agent (alkali solution) is applied by nozzles 1 and 2 and nozzles 4 and 5 apply rinsing water. In the final Office Action, the Examiner indicates that even though EP '854 discloses nozzles 1 and 2 applying a cleaning agent (an aqueous alkali solution) and nozzles 4 and 5 apply water, this distinction is not

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important because EP '854 otherwise meets the structural limitations of Appellants' claims 1 and 12. Appellants' respectfully disagree. The cleaning agent is an element of the apparatus. Appellants' apparatus uses the cleaning agent when the apparatus chemically and mechanically removes residual material as well as when the apparatus chemically and electrochemically removes residual material. A chemical removal of residual material is required in both steps. Even though EP '854 has two sets of nozzles that use the same cleaning agent (the aqueous alkali solution), these nozzles only do electrocleaning. EP '854 additionally discloses two (or more) sets of nozzles that apply rinsing water. Further, even if the Board were to consider that rinsing water functions to chemically remove residual material, the nozzles that electrochemically clean use a different cleaning agent (aqueous alkali solution) than the rinsing nozzles (water) and thus do not both use the same cleaning agent as required by claims 1 and 12.

For all of the above reasons, EP '854 cannot anticipate Appellants' claims 1 and 12 because EP '854 has not disclosed each element of Appellants' claims 1 and 12.

Inasmuch as claims 2 to 4, 10, 11, 13, 19 and 20 depend from claims 1 and 12, and since claims 1 and 12 are believed to be patentable over the cited art, then claims 2 to 4, 10, 11, 13, 19 and 20 are believed to be patentable as well. No independent ground of patentability is asserted for claims 2 to 4, 10, 11, 13, 19 and 20.

## **II. The §103 Rejections:**

**A.** Claims 5 and 14 have been rejected by the Examiner under 35 USC §103(a) as being unpatentable over EP '854 in view of Geissler.

**10/026,264****Patent**  
**IBM Docket No. FIS920010260US1****(i) Patentability of claims 5 and 14**

The Examiner has failed to state a prima facie case of obviousness with respect to claims 5 and 14.

"To establish *prima facie* obviousness of a claimed invention, all the claim limitations must be taught or suggested by the prior art." MPEP §2143.03. "All words in a claim must be considered in judging the patentability of that claim against the prior art." In re Wilson, 424 F.2d 1382, 1385, 165 USPQ 494, 496 ((CCPA 1970).

As Appellants will argue, each of claims 5 and 14 contain limitations which are not taught or suggested by the prior art, thereby compelling the conclusion that claims 5 and 14 are not rendered obvious by the prior art.

As Appellants explained above, EP '854 does not teach Appellants' invention as embodied in claims 1 and 12. Beyond that, Geissler does not teach an insulating supply conduit as taught by Appellants. It is noted that Geissler teaches the "flood tubes" and supply lines are made of plastic. However, this does not teach Appellants' invention as embodied in claims 5 and 14 which requires an insulating supply conduit in conjunction with a power source connected to the nozzle. The object of this aspect of Appellants' invention is to avoid current from the nozzle going back down the supply line. Since Geissler's nozzle is not connected to a power source, the teaching of Geissler is not applicable to Appellants' invention. Since EP '854 can not supply the deficiencies of Geissler, claims 5 and 14 must be considered to be allowable over the cited combination of prior art.

In the final Office Action, the Examiner indicates that the teaching of Geissler is that conductive tubes affect the electrical field between the anode and the cathode and this would be

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the case regardless of whether the nozzle is connected to the power source. But, the Examiner still has not provided any disclosure in EP '854 or Geissler to teach (i) a power source connected to the nozzle and (ii) an insulating supply conduit to the nozzle. The supply conduit in Appellants' invention is not within the electric field between the anode and cathode so any teaching of Geissler with respect to the plastic flood tubes being made of plastic so as not to disturb the electric field between the anode and cathode would seem to be irrelevant with respect to Appellants' invention. The Examiner has failed to state a prima facie case of obviousness with respect to claims 5 and 14 because the combination of references cited by the Examiner do not teach or suggest every limitation of claims 5 and 14.

**B.** Claims 6, 7, 9 15, 16, 18, 21 and 22 have been rejected by the Examiner under 35 USC §103(a) as being unpatentable over EP '854 in view of Chandross.

Inasmuch as claims 6, 7, 9, 15, 16, 18, 21 and 22 depend from claims 1 and 12, and since claims 1 and 12 are believed to be patentable, then claims 6, 7, 9, 15, 16, 18, 21 and 22 should be patentable as well.

**(i) Patentability of claims 6 and 15**

It is submitted that the Examiner has failed to state a prima facie case of obviousness with respect to claims 6 and 15.

Claims 6 and 15 recite that the cleaning agent is tetramethylammonium hydroxide (TMAH). When claims 6 and 15 are read together with claims 1 and 12, the cleaning agent to chemically

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and mechanically remove residual material and to chemically and electrochemically remove residual material is TMAH.

The teaching of EP '854 is that electrolytic cleaning is accomplished with an aqueous alkali solution followed by rinsing with water. Assuming arguendo that water in EP '854 chemically and mechanically removes some residual material, then EP '854 teaches two cleaning agents - aqueous alkali solution for electrolytic cleaning and water for chemical and mechanical cleaning. Chandross teaches the use of TMAH for etching. If a person skilled in the art were to combine EP '854 and Chandross, it is submitted that the TMAH of Chandross could be substituted for the aqueous alkali solution for electrolytic cleaning in EP '854 since both are chemical compositions for chemically removing residual material. But where is the teaching to replace the water rinse of EP '854 with the TMAH of Chandross? It is submitted that there is no such teaching nor has the Examiner provided such teaching. Appellants have found no teaching in EP '854 or Chandross to replace a water rinsing solution with TMAH in view of the dissimilar nature of TMAH and water. Accordingly, the Examiner has failed to state a prima facie case of obviousness with respect to claims 6 and 15.

**(ii) Patentability of claims 7, 16, 21 and 22**

In addition, claims 7, 16, 21 and 22 are believed to be independently patentable in that the Examiner has not stated a prima facie case of obviousness. It is noted that EP '854 fails to teach Appellants' claims 1 and 12. EP '854 in combination with Chandross does not teach Appellants' claims 7, 16, 21 and 22. Chandross discloses a concentration of TMAH applicable to electrolytic etching where the part to be etched is immersed in the etchant. Chandross admits that the concentration is not very critical (col. 4, lines 53-54). Appellants' invention, however, sprays the TMAH through a nozzle onto the workpiece and uses the TMAH to conduct electricity between

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the nozzle and the article to be cleaned. The concentration of TMAH is much more critical here.

In the final Office Action, the Examiner states that Appellants have not provided any support for the criticality of the TMAH concentrations and, further, that the combination of EP '854 and Chandross is appropriate since they are both concerned with the same endeavor, namely electrolytically removing material.

Appellants disagree. Electrolytic etching by immersion and by spraying are different processes which require different operating parameters. Electrolytic etching by spraying differs from electrolytic etching by immersion in two significant ways. With electrolytic etching by spraying, the spray has to have sufficient electrolyte concentration so as to maintain an electrical circuit through the spray and the workpiece is in contact with the spray for less time. A localized electrolytic cell is formed between the article to be cleaned and the nozzle. "The successful formation of this electrolytic cell is critical to achieving effective electrocleaning." (Specification page 23, lines 11-12). Too much cleaning agent is to be avoided as it increases disposal costs. Accordingly, it is submitted that the Examiner has failed to state a prima facie case of obviousness with respect to claims 7, 16, 21 and 22. Thus, claims 7, 16, 21 and 22 are believed to be independently patentable in that the combination of the cited references do not teach or suggest every limitation of the claims.

Alternatively, the combination of EP '854 and Chandross cannot render obvious Appellants' claims 7, 16, 21 and 22. Electrolytic spray cleaning as taught by EP '854 and immersion electrolytic etching as taught by Chandross are distinctly different processes in which the respective concentrations of the cleaning agent/etching agent could differ. The Examiner has not provided sufficient rationale or motivation for combining EP '854 and Chandross.



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It is not enough that one may modify a reference in view of a second reference, but rather it is required that the second reference suggest modification of the first reference and not merely provide the capability of modifying the first reference.

An obviousness rejection cannot be based on the resort of the Examiner to various non-pertinent references and the combination of bits and pieces of the references in light of Applicants' teachings. An extensive discussion of the criteria to be applied in obviousness rulings is set forth in Aqua-Aerobic Systems Inc. v. Richards of Rockford Inc., 835 F.2d 871; 1 USPQ 2d 1945, 1956 (N.D. Ill. 1986). For example, the court has cited In re Gordon, 733 F.2d 900, 902; 221 USPQ 1125, 1127 (Fed. Cir. 1984), which states that

The mere fact that the prior art could be modified would not have made the modification obvious unless the prior art suggested the desirability of the modification.

Further, the CAFC, in In re Oetiker, 977 F.2d 1443, 1447; 24 USPQ2d 1443, 1445 (CAFC 1992) held:

There must be some reason, suggestion, or motivation found in the prior art whereby a person of ordinary skill in the field of the invention would make the combination. That knowledge can not come from the applicant's invention itself.

The CAFC again reaffirmed the criteria for obviousness in In re Fritch, 972 F.2d 1260, 1266; 23 USPQ 2d 1780, 1783-1784 (Fed. Cir. 1992), where the court said:

Obviousness cannot be established by combining the teachings of the prior art to produce the claimed invention, absent some teaching or suggestion supporting the combination. Under section 103, teachings of references can be combined only if there is some suggestion or incentive to do so.

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The court went on to say that "It is impermissible to use the claimed invention as an instruction manual or 'template' to piece together the teachings of the prior art so that the claimed invention is rendered obvious."

The motivation set forth by the Examiner for combining the teaching of EP '854 with Chandross is neither clear nor sufficient. While both of EP '854 and Chandross relate to electrolytic processes, EP '854 pertains to the removal of residue from an article while Chandross pertains to etching the article. How then could the Chandross teaching pertaining to etching be relevant to the EP '854 cleaning of an article? According to the Examiner in the final Office Action, it would be obvious to modify EP '854 according to Chandross "because TMAH is a known solution for use in electrolytic etching, and the use of a known compound for its known purpose is an obvious modification." But again, the alkali solution in EP '854 is used for cleaning of an article - not etching the article. So then, how does the Examiner conclude that a teaching regarding electrolytic etching is pertinent to electrolytic cleaning? Appellants are left to wonder as the Examiner has not clearly and sufficiently stated his rationale or motivation for combining EP '854 and Chandross. Accordingly, the rejection of claims 7, 16, 21 and 22 based on the combination of EP '854 and Chandross must fail as the Examiner has failed to state a reason, suggestion or motivation whereby a person skilled in the art would make the combination.

C. Claims 8 and 17 have been rejected by the Examiner under 35 USC §103(a) as being unpatentable over EP '854 in view of Wee.

Inasmuch as claims 8 and 17 depend from claims 1 and 12, and since claims 1 and 12 are believed to be patentable, then claims 8 and 17 are believed to be patentable as well. No independent ground of patentability is asserted for claims 8 and 17.

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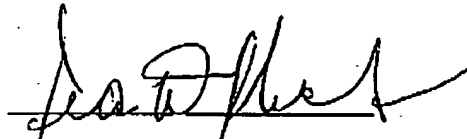
**Patent**  
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**SUMMARY:**

In view of all of the preceding remarks, it is submitted that claims 1 to 22 are in condition for allowance, that the Examiner's various rejections of claims 1 to 22 are erroneous and reversal of the Examiner's decisions is respectfully requested.

Respectfully Submitted,

Raschid J. Bezama, et al.

A handwritten signature in dark ink, appearing to read 'Ira D. Blecker', written over a horizontal line.

Ira D. Blecker Reg. No. 29,894

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**10/026,264****Patent  
IBM Docket No. FIS920010260US1****CLAIMS APPENDIX:**

1. An apparatus for cleaning residual material from an article comprising:
  - a) a source of a cleaning agent;
  - b) at least one pair of opposing spray nozzle assemblies directed to spray an article interposed between the opposing spray nozzle assemblies, a first of the opposing spray nozzle assemblies comprising a first nozzle for spraying the cleaning agent in a first pattern and a second nozzle for spraying the cleaning agent in a second pattern, and a second of the opposing spray nozzle assemblies comprising a first nozzle for spraying the cleaning agent in a third pattern;
  - c) a supply conduit from the source of the cleaning agent to each of the first and second nozzles;
  - d) a power source electrically connected to the second nozzle; and
  - e) a transport apparatus to transport one of the opposing nozzle assemblies and the article with respect to each other;
  - f) wherein, in operation, in a first pass the first nozzle of at least the first nozzle assembly is operable to spray the article with a spray of the cleaning agent as the first nozzle assembly and article are transported with respect to each other to chemically and mechanically remove residual material from the article and in a second pass the second nozzle of the first nozzle assembly is operable to spray the article with a cleaning agent as a voltage is applied between the second nozzle of the first nozzle assembly and the article and as the first nozzle assembly and article are

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transported with respect to each other to chemically and electrochemically remove the remaining residual material from the article.

2. The apparatus of claim 1 wherein, in operation, the first nozzle of the second nozzle assembly is operable in conjunction with the first nozzle of the first nozzle assembly during the first pass to chemically and mechanically remove residual material from the article.
3. The apparatus of claim 1, wherein, in operation, the first nozzle of the second assembly is operable in conjunction with the second nozzle of the first nozzle assembly during the second pass to chemically and mechanically remove residual material from the article.
4. The apparatus of claim 1 wherein the first and second nozzle assemblies further comprise a rinsing nozzle and wherein, in operation, in a third pass the rinsing nozzles of the first and second nozzle assemblies are operable to spray a rinsing fluid on the article as the nozzle assemblies and article are transported with respect to each other to rinse the cleaning agent from the article.
5. The apparatus of claim 1 wherein the supply conduit for at least the second nozzle is insulating and of sufficient length so as to create a resistance that is at least an order of magnitude greater than a resistance between the second nozzle and the article.
6. The apparatus of claim 1 wherein the cleaning agent is tetramethylammonium hydroxide (TMAH).

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7. The apparatus of claim 6 wherein the concentration of the TMAH in the spray in the first and second passes is in the range of 0.2 to 2 weight percent.
8. The apparatus of claim 1 wherein the second nozzle comprises a plurality of holes through which the cleaning agent is sprayed, the holes having a diameter of 0.030 inches with a center to center pitch spacing of 0.066 for a pitch/hole diameter ratio of 2.2.
9. The apparatus of claim 6 wherein the concentration of the TMAH in the spray in the first and second passes is the same.
10. The apparatus of claim 1 wherein the article is a metallic screening mask.
11. The apparatus of claim 1 wherein the residual material is a metal-containing paste.
12. An apparatus for cleaning residual material from an article comprising:
- a) a source of a cleaning agent;
  - b) at least one pair of opposing spray nozzle assemblies directed to spray an article interposed between the opposing spray nozzle assemblies with each of the opposing spray nozzle assemblies comprising a first nozzle for spraying the cleaning agent in a first pattern and a second nozzle for

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spraying the cleaning agent in a second pattern;

c) a supply conduit from the source of the cleaning agent to each of the first and second nozzles;

d) a power source electrically connected to the second nozzles; and

e) a transport apparatus to transport one of the opposing nozzle assemblies and the article with respect to each other;

f) wherein, in operation, in a first pass the first nozzle of each of the nozzle assemblies is operable to spray the article with a spray of the cleaning agent as the nozzle assemblies and article are transported with respect to each other to chemically and mechanically remove residual material from the article and in a second pass the second nozzles of each of the nozzle assemblies is operable to spray the article with a cleaning agent as a voltage is applied between the second nozzles of each of the nozzle assemblies and the article and as the nozzle assemblies and article are transported with respect to each other to chemically and electrochemically remove the remaining residual material from the article.

13. The apparatus of claim 12 wherein the first and second nozzle assemblies further comprise a rinsing nozzle and wherein, in operation, in a third pass the rinsing nozzles of the first and second nozzle assemblies are operable to spray a rinsing fluid on the article as the nozzle assemblies and article are transported with respect to each other to rinse the cleaning agent from the article.

14. The apparatus of claim 13 wherein the supply conduit for at least the second nozzles is insulating and of sufficient length so as to create a resistance that is at least an order of magnitude

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greater than a resistance between the second nozzles and the article.

15. The apparatus of claim 12 wherein the cleaning agent is tetramethylammonium hydroxide (TMAH).

16. The apparatus of claim 15 wherein the concentration of the TMAH in the spray in the first and second passes is in the range of 0.2 to 2 weight percent.

17. The apparatus of claim 12 wherein the second nozzles comprise a plurality of holes through which the cleaning agent is sprayed, the holes having a diameter of 0.030 inches with a center to center pitch spacing of 0.066 for a pitch/hole diameter ratio of 2.2.

18. The apparatus of claim 15 wherein the concentration of the TMAH in the spray in the first and second passes is the same.

19. The apparatus of claim 12 wherein the article is a metallic screening mask.

20. The apparatus of claim 12 wherein the residual material is a metal-containing paste.



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21. The apparatus of claim 6 wherein the concentration of the TMAH in the spray in the first and second passes is in the range of 0.4 to 0.5 weight percent.

22. The apparatus of claim 15 wherein the concentration of the TMAH in the spray in the first and second passes is in the range of 0.4 to 0.5 weight percent.

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**EVIDENCE APPENDIX:**

COPIES OF REFERENCES CITED BY THE EXAMINER TO FOLLOW

Chandross et al. U.S. Patent 5,849,173

European Patent Application 0 870 854

Geissler et al. U.S. Patent 6,238,529

Wee et al. U.S. Patent 6,383,303

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**RELATED PROCEEDINGS APPENDIX:**

**NO DECISIONS HAVE BEEN RENDERED IN RELATED PROCEEDINGS**